

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2302

Roll No.

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B.Tech.

(SEM. II) EVEN THEORY EXAMINATION 2012-13

ELECTRICAL ENGINEERING

Time : 3 Hours

Total Marks : 100

Note :- Attempt all Sections. Assume missing data, if any.

SECTION—A

1. Answer all parts of this section : (2×10=20)
- (a) $V = \sqrt{2} \cdot 200 \cos 500t$, $P_{av} = 250$ W, power factor = 0.7 lagging. Calculate the reactive power of the system.
- (b) What will be the current at resonance in series and parallel RLC circuit ?
- (c) Enlist types of rotor of an alternator.
- (d) The full load copper-loss and iron-loss of a transformer are 6400 W and 5000 W respectively. The above losses at half load are _____.
- (e) Write an expression of sensitivity of a voltmeter.
- (f) An induction motor has a rated speed of 715 rpm. How many poles have its rotating magnetic field ?
- (g) A three-phase induction motor connected in star takes 5 A. When connected in delta, what will be current ?

- (h) A voltage source of 100V has an internal impedance 2Ω and supplies a load having that same impedance. How much power is absorbed by the load ?
- (i) What is the voltage level range of power generated in a power station ?
- (j) Enlist the various types of moving iron instruments.

SECTION—B

2. Answer any **three** parts of this section : $(10 \times 3 = 30)$
- (a) Obtain the Norton's equivalent circuit at terminal AB of the network shown in fig. 2(a).

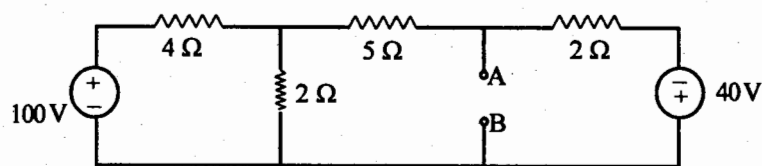


Figure-2(a)

- (b) A resistance and inductance are connected in series across a voltage $v = 283 \sin 314t$. An expression of current is found to be $i = 4 \sin(314t - 45^\circ)$. Find the values of resistance, inductance and power factor.
- (c) Explain the essential torques of an indicating instrument in detail.
- (d) What do you understand by the term "ideal transformer"? Why the efficiency of transformer is high as compared to other machines ?
- (e) What are the different types of dc motors ? Also write the applications of each.

SECTION—C

Note:— Answer **all** questions of this section :

$(10 \times 5 = 50)$

3. What is the criterion for star-delta transformation ? Develop the relationship for delta-to-star and star-to-delta transformation.
4. Obtain the power factor of a two branch parallel circuit, where the first branch has $\bar{Z}_1 = (2 + j4)\Omega$ and second $\bar{Z}_2 = (6 + j0)\Omega$. To what value must the 6Ω resistor be changed to result in overall power factor 0.9 lagging ?

OR

A 100 V, 80 W lamp is to be operated on 230 V, 50 Hz ac supply. Calculate the inductance to be connected in series with the lamp for the above operation. Lamp can be taken as pure resistance.

5. Describe working principle of PMMC instruments. Why is the scale linear ?

OR

A 50 A, 230 V energy meter on full-load test makes 61 revolutions in 37 seconds. If the normal disc speed is 500 revolution per kWh, find the percentage error.

6. Prove that, for a single-phase transformer

$$(kVA)_{\max} = (kVA)_{\text{rated}} \sqrt{\frac{P_{\text{core}}}{P_{\text{cu rated}}}}$$

OR

A balanced star connected load of $(\theta + j6)\Omega$ per phase is connected to a 3-phase 400 V supply. Find the line current, power factor and three phase VAs.

7. Why synchronous motor is not self-starting ? Explain the various methods of starting these motors.

OR

Explain with the help of diagrams, how a rotating field is produced in the air gap of a three-phase induction motor.